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USCONARC
U S ARMY
ARCTIC TEST BOARD

Fort Greely, Alaska



Report of

ARCTIC PHASE OF

CONSOLIDATED (JOINT) ENGINEER/SERVICE TEST OF

QUICK-SERVE MEALS

Date 18 June 1962

Project Nr. ATB 3-202 and
QM R&E FEA 62010



HEADQUARTERS
UNITED STATES CONTINENTAL ARMY COMMAND
FORT MONROE, VIRGINIA

ATDEV-3

18 July 1962

SUBJECT: Report of Project No ATB 3-202 and QM R&E FEA Report of Project FEA 62010, Arctic Phase of Consolidated (Joint) Engineer/Service Test of Quick-Serve Meals

TO: Chief of Research and Development
Department of the Army
Washington 25, D.C.

1. References:

a. Letter, ATDEV-3 427, HQ USCONARC, 16 June 1962, subject: "Quick-Serve Meals," with 1st Indorsement, OCRD, 26 June 1962.

b. Letter, ATDEV-3 430, HQ USCONARC, 16 January 1962, subject: "Temperate Tests of Quick-Serve Meals," with 1st Indorsement, OCRD, 1 March 1962.

2. A review of the attached subject report by this headquarters resulted in the following conclusions:

a. The concept of feeding precooked, dehydrated meals in the field has a high level of troop and command acceptability and is suitable for use under arctic winter conditions.

b. As many as practical of the shortcomings and improvements listed in Annex A should be corrected or incorporated.

c. Development of an efficient, lightweight heating device should be continued on an expedited basis to provide a means of heating the amount of water required for preparation of the Quick-Serve Meals.

3. USCONARC recommends that:

a. No action be taken to type classify the Quick-Serve Meal until the industrial preparedness study is completed as outlined in reference 1b above.

b. Development of suitable heating devices be expedited and improved test heaters be provided for evaluation at the earliest practicable date.

FOR THE COMMANDER:

1 Incl

USAATB Report of Arctic Phase
of Consolidated (Joint) Engineer/Service Test of Quick-Serve Meals, 18 Jun 62



LEE L. STEWART

Colonel, AGC
Asst Adjutant General

Copies furnished:

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HEADQUARTERS
US ARMY ARCTIC TEST BOARD
APO 733, Seattle, Washington

ARCTIC PHASE OF CONSOLIDATED (JOINT) ENGINEER/SERVICE
TEST OF QUICK-SERVE MEALS

QM R&E FEA Report of
Project FEA 62010

USAATB Report of
Project Nr 3-202

1. AUTHORITY:

a. Directive:

(1) Ltr, ATDEV-3 400, Hq USCONARC, 31 August 1961, subject: "Arctic Phase of Consolidated Engineer/Service Test of Quick-Serve Meals and Evaluation of Associated Heating Devices."

(2) Ltr of Authorization, QMASOF-MAG, Field Test Coordination Branch, Hq, QM R&E Command, 21 August 1961, subject: "FEA 62010, Arctic Engineering Test of the 6-man and 25-man Modules of the Experimental Quick-Serve Meal."

b. Purpose: To determine the suitability of the Quick-Serve Meals for Army use under arctic winter conditions.

2. REFERENCES:

a. DA Project Nr: 7-84-06-032. RDB Technical Objective Nr: PO-7.

b. CDOG, Par 1439 f(15), Change 6, 3 July 1961.

c. Reports of Equipment Failures Nr 1 through 15, Project Nr ATB 3-241, US Army Arctic Test Board.

d. RDT&E Project Card, Hq QMR&E Command, 31 December 1959, subject: "Simplified Food Logistics (C)."

e. Technical Report, T-127, 58037-F, QMF&E, 15 March 1960, subject: "An Engineering Test of the 6-man and 25-man Modules of the Experimental Quick-Serve Meal."

f. Ltr, ATDEV-3 400-114, Hq USCONARC, 26 January 1961, subject: "USCONARC-Approved Military Characteristics for Operational Rations" w/1st Ind, DA OCRD, dated 26 April 1961.

ASTIA Availability Notice

Qualified requesters may obtain copies of
this report from ASTIA.

g. Plan of Test of Project FEA 62010, QM R&E Field Evaluation Agency, October 1961, subject: "Arctic Engineering Test of the 6-man and 25-man Modules of the Experimental Quick-Serve Meal."

h. Plan of Test of Project Nr ATB 3-202, US Army Arctic Test Board, 24 November 1961, "Arctic Phase of Consolidated Engineer/Service Test of Quick-Serve Meals."

i. Report of Project, USAIB Nr 2943, and QM R&E FEA 61023, United States Army Infantry Board, December 61, "Consolidated Report of the Temperate Phase of Consolidated Engineer/Service Test of Quick-Serve Meals" w/1 incl Tech Report FEA 61023 and 1st Ind, ATDEV-3 430, Hq USCONARC, dtd 16 January 1962.

j. Report of Test, Project Nr ATB 3-202-1, US Army Arctic Test Board, 18 June 1962, "Evaluation of Heating Devices for the Quick-Serve Meals."

3. DESCRIPTION OF MATERIEL:

a. The Quick-Serve Meals are non-perishable, primarily pre-cooked, dehydrated food components, assembled in 6 and 25-man modules, which can be prepared for consumption by adding hot or cold water, as appropriate; followed by mixing and allowing to stand from 5 to 20 minutes depending upon the menu being prepared. The carton contains all equipment, other than a water heating device required for preparation and consumption. All necessary mess gear is expendable and is packaged with the meal. Twenty-one different menus are provided. A typical noon meal consists of: Precooked dehydrated chili con carne with beans, bread, jelly, applesauce, chocolate caramel roll, paper drinking cups, nested fiberboard serving trays, plastic knives, spoons, serving ladles, container in which required water may be heated and individual accessory packets containing gum, toilet paper, cigarettes, matches, coffee, dry cream, sugar, and three rifle patches.

b. The control item was the Ration, Small Detachment, 5 persons (phase I only).

c. A total of 18,480 meals in 6-man modules and 8,875 meals in 25-man modules were received at the US Army Arctic Test Board on 22 August 1961. A complete maintenance package was received.

d. Photographs of the test meal are shown as Annex C.1, C.2, and C.3.

4. BACKGROUND:

a. A requirement for the Quick-Serve Meal is stated in reference 2b.

b. In an effort to reduce the over-all logistical problems involved in the feeding of highly mobile military forces, and to simplify the logistical support required to feed the soldier in combat, a program was initiated in 1955 to develop a feeding system based on precooked dehydrated meals. A new concept was proposed and designated Simplified Food Logistics (ref 2d). This concept envisioned the use of three types of meals as follows (ref 2f).

(1) A 25-man uncooked meal for normal feeding in the rear area and in the forward combat areas, except when prohibited by the tactical situation.

(2) Quick-Serve Meals packaged in 6-man and 25-man modules to be used both in the rear areas and in the forward combat areas when the tactical situation precludes the preparation and serving of the 25-man uncooked meal.

(3) An individual, ready-to-eat meal to be used to feed troops at times when it is impractical to provide the 25-man uncooked meal or the 25-man and 6-man Quick-Serve Meal.

c. Sufficient experimental prototypes of the 6 and 25-man meals had been developed by 1958 to permit trial procurement of a three-day cycle for engineer concept testing in May and June 1959. The results of this test revealed that the ration met the draft military characteristics with the following exceptions: (1) Weight of ration of one pound per module was exceeded, (2) camouflage characteristics were poor, and (3) ration package contained too many packaging items. The ration acceptability was initially high, but the acceptability tended to decrease when used as a steady diet for a 3-day period (ref 2e). This test provided guidance for further development and valuable production experience.

d. The Temperate Phase of the Consolidated Engineer/Service Test was conducted during the first part of 1961 (ref 2i). Recommendation as a result of this test was that the Quick-Serve Meal, excluding any consideration of cost, be considered acceptable for Army use with a further recommendation that industrial preparedness studies be accelerated with a view to improving the mobilization base for the Quick-Serve Meal.

e. This item is proposed for tripartite standardization and is included on NSL No 7-5-2-1 and IEL 7-5-102-1.

5. SUMMARY OF TEST RESULTS: Tests were conducted by Captain Robert G. Burns, Infantry, and other personnel of Test Division 3, US Army Arctic Test Board, Captain Daniel J. Fischer, Quartermaster Corps, and other personnel of Test Det Nr 1 (Prov) QM Field Evaluation Agency, assisted by other personnel from the US Army Arctic Test Board, members of the Cold Weather and Mountain School, 1st Battle Group 23d Infantry and the 1st Battle Group 9th Infantry including Co A, 40th Armor and Battery A, 15th Field Artillery, utilizing Plans of Test, references 2g and h.

a. General:

(1) This test was conducted in three phases as follows:

(a) Phase I (Controlled): Personnel of an Infantry Rifle Platoon (USARAL Troop Support) and personnel of the Cold Weather and Mountain School and this Board consumed the test meal during two 7-day periods and the control rations during a 3-day period. Test meals consumed during the first 7-day period were cold-soaked for 65 days at temperatures ranging from 41°F to -42°F. Test meals consumed during the second 7-day period were cold-soaked for 100 days at temperatures ranging from 41°F to -66°F. The control ration was cold-soaked for 74 days at temperatures ranging from 41°F to -42°F prior to consumption.

(b) Phase II (Exercise "GREAT BEAR"): Personnel from two rifle companies, one artillery battery and one tank platoon of the USARAL element participating in exercise "Great Bear" consumed the test meal during a 3 to 5-day period. Test meals consumed during this period were cold-soaked for 133 days at temperatures ranging from 41°F to -66°F.

(c) Phase III (Extended Storage): Personnel of US Army Arctic Test Board consumed test meals that had been exposed in open storage during the period 1 October 1961 to 1 March 1962. Ambient temperatures during this period ranged from 41°F to -66°F.

(2) In addition to the above tests, the cold-soaked test meals were consumed by personnel of the US Army Arctic Test Board during arctic winter training exercises and during the conduct of other test projects, and by groups visiting the Board during orientations and demonstrations. The results of these tests have been integrated, where appropriate, in the results of the above tests.

(3) Prior to the initiation of Phase I and Phase II of the test all participating troops were given a four-hour orientation on the Quick-Serve Meal and associated water heating devices.

(4) Prior to and at the end of Phase I all participating troops were given a physical examination by the Post Surgeon. Physical examination consisted of visual inspection and weighing of the individual. During the periods the Quick-Serve Meals were consumed all additional food items, i.e., canned goods, candy, beverages, etc. were removed from the individual. No Post Exchange items were sold during these periods (Phase I only).

(5) The following items of equipment were used during the test and appear in the test report in abbreviated form:

	<u>NOMENCLATURE</u>	<u>SHORT TITLE</u>
(a)	Heater, Space, Radiant Type Portable, Leaded or Unleaded Gas Burner, 60,000 BTU's Output.	Yukon Stove
(b)	Sled, Scow, Type, 200 lb Capacity.	AHKIO

NOMENCLATURE

SHORT TITLE

(c) Ration, Small Detachment, 5 5-in-1 Rations
Persons.

(d) Armored Personnel Carrier, M59. M59 APC

(6) The Quick-Serve Meal failed to meet the following military characteristics for reasons indicated:

(a) "Shall be of minimum weight and bulk consistent with other requirements. Gross weight of case containing 25 meals will not exceed 35 pounds. Gross weight of case containing 6 meals shall not exceed 9 pounds." Over-all average weight of the 25-man module was 36.38 pounds (Test Nr 1).

(b) "Cases and packages shall be easily opened. If an opener is needed for this purpose, it shall be provided as a readily accessible part of the packaged meal." Outer container could not be opened without difficulty (Test Nr 2).

(7) The Quick-Serve Meal (6 and 25-man module) was satisfactory with respect to ease of preparation in a heated shelter (excluding ease and speed of water preparation), quantity of food, troop acceptability, aerial delivery, command acceptability and durability.

(8) The Quick-Serve Meal (6 and 25-man module) was marginally satisfactory with respect to ease of opening outer container, ease of disposal of unconsumed elements, adequacy of instructions for preparation, time required to prepare and consume the meal, water requirements, ease of transporting because of additional cubage of the 6-man module over the 5-in-1 ration, and in case of the 25-man module, weight.

(9) Standard and experimental heating devices utilized during this test were unsatisfactory with respect to ease and speed of water heating when used for preparation of the Quick-Serve Meal (ref 2j).

(10) In several instances lack of adequate production control of packaging was noted. Errors occurred in labeling, packing of preparation instructions, packing of proper components for each menu and quantities of components packed with meals.

(11) The Quick-Serve Meal (6 and 25-man module) was superior to the control ration with respect to weight, ease of preparation (after boiling water was obtained), troop and command acceptability. The Quick-Serve Meal was equal to the control ration with respect to durability, water requirements, quantity of food, ease of disposing of unconsumed contents, and time to prepare and consume the meal. The Quick-Serve Meal was inferior to the control ration with respect to aerial delivery, size (cube) and quality control.

b. Test Nr 1 - Preoperational Inspection and Physical Characteristics:

(1) Inspection of contents at the time of opening of the container for meal preparation revealed that the test meals were generally in proper condition for test. There were some inconsistencies in packaging as reported in Test Nr 2.

(2) The average weight of the test 6-man module was nine pounds, average cube 0.56 cubic feet; 25-man module average weight was 36.38 pounds, average cube 1.74 cubic feet; 5-in-1 ration average weight was 31.31 pounds and average cube 1.07 cubic feet.

(3) Photographs of the Quick-Serve Meal and the control ration are shown in Annexes C.1, C.2, and C.3.

c. Test Nr 2 - Operational Performance Characteristics:

(1) Considerable difficulty was experienced when attempts were made to feed the Quick-Serve Meal in sub-zero temperatures outside a heated shelter. When prepared and consumed inside a 10-man arctic tent heated with a Yukon Stove, no appreciable difficulties were encountered other than boiling the required amount of water.

(2) Of the participating test troops, 65.2 percent indicated that the test meal was very easy to prepare, 32.6 percent indicated that the test meal was moderately easy to prepare, 58.4 percent indicated that the control ration was moderately hard to prepare and 22.0 percent indicated that the control ration was very hard to prepare.

(3) Of the commanders questioned, 83.3 percent preferred the 6-man module size, none preferred the 25-man module, and the remaining percentage preferred modules of a size to feed 3 to 12 men.

(4) In most cases beans, meat balls, and the large pieces of beef were hard and tough after reconstitution. Most test personnel commented on the strong and lasting taste of the onions in one breakfast menu.

(5) Several inconsistencies in packaging of the test ration were recorded.

(6) The principal difficulty encountered related to bringing water to a boil for meal reconstitution.

d. Test Nr 3 - Aerial Delivery: Test and control rations were aerial delivered by both parachute and free fall with a recovery assurance for both rations of better than 95 percent.

e. Test Nr 4 - Impact on Tactical and Logistical Operation:

(1) During Exercise "Great Bear" the Quick-Serve Meal was introduced into the general support agency supporting participating troops. Test meals were requisitioned by selected units and delivered per normal Class I supply procedures. Test meals were delivered to troop units by trucks, M59 APC, Nodwell carriers, and H-21 helicopter. No problems were encountered except mixing of menu and menu numbers during loading and transport.

(2) Rifle platoon carrying parties transported the test meals to forward positions in rucksacks and Ahkios without difficulty. The artillery battery and the tank platoon experienced difficulty in transporting on organic transportation the five days of Quick-Serve Meals issued.

(3) During the feeding period, the rifle companies were employed in a holding position. All meals were prepared inside a 10-man tent heated with a Yukon Stove. Snow was generally used as a water source. No difficulties were encountered other than the time required to melt snow and boil the water. The artillery battery and tank platoon moved frequently during the first two days of the feeding period and were unable to feed the Quick-Serve Meal because of time limitations.

(4) Average times required to prepare, serve, consume and effect necessary police for the rations during Phase I ranged from 66 to 84 minutes for the 6-man module of the test ration, and 65 to 74 minutes for the 5-in-1 ration depending upon types of water heating device and feeding situation. During Phase II the average time for the test ration ranged from 70 to 110 minutes.

f. Test Nr 5 - Command Acceptability: The test data indicated a definite preference for the Quick-Serve Meal as opposed to the 5-in-1 ration. Reservations concerning time to prepare and consume the meal particularly as related to obtaining required boiling water were often stated. Principal advantages stated were the quality and variety of the food and the ability to serve a hot meal when desired.

6. DISCUSSION:

a. Test results indicated an over-all preference for the Quick-Serve Meal over the control 5-in-1 ration and no deficiencies were developed which should preclude adoption at this time. Throughout the test, however, limitations were imposed by the time and effort required to obtain the boiling water for the meal reconstitution. No efficient device was provided for this purpose nor was a suitable heating device for small unit use with the Quick-Serve Meal found within the supply system (ref 2j). The Quick-Serve Meals' strong dependence on an efficient means of boiling water indicates the item, although suitable per se, should not be adopted until a suitable heating device becomes available.

b. The 5-in-1 ration does not require the efficiency in a heating system as does the Quick-Serve Meal. Components of this ration can be thawed on vehicle exhausts or heater ducts, etc., and consumed as is, or in an emergency consumed frozen. Such expedients are impossible with the Quick-Serve Meal as in each and every instance an efficient heater to provide a specified amount of boiling water is required before the meal can be consumed.

c. As indicated above, the Quick-Serve Meal is preferred over the 5-in-1 ration if boiling water can be obtained in the forward area rapidly and economically from the logistical point of view. Until such a method or device is provided to boil the water, the Quick-Serve Meal will have little application in areas where water is normally found in the solid state.

7. CONCLUSIONS: It is concluded that:

a. The Quick-Serve Meal is suitable for Army use under arctic winter conditions.

b. The experimental heating devices provided were not suitable for use with the test ration in the arctic and no suitable heating device for small unit use with the Quick-Serve Meal was found within the supply system.

c. As many as practicable of the shortcomings and suggested improvements listed in Annex A should be corrected, or incorporated.

d. The advantages which the Quick-Serve Meal has over the 5-in-1 ration are materially offset by the lack of suitable device or method to rapidly boil the water required for meal reconstitution.

e. A lightweight efficient heating device or method to provide boiling water for the Quick-Serve Meal should be developed on an expedited basis.

8. RECOMMENDATIONS: It is recommended that:

a. The Quick-Serve Meal be considered suitable for Army use under arctic winter conditions.

b. Developmental effort be continued to correct the shortcomings and to incorporate the suggested improvements listed in Annex A, as practicable.

c. A lightweight efficient device or method be developed on an expedited basis to provide boiling water required for meal reconstitution.

d. Type classification action on the Quick-Serve Meal be withheld pending development of a suitable heating device.

Alfred H. Garthun, Jr. H-66

for ARTHUR H. NELSON
Colonel, QMC
CO, QMFEA

Henry E. Davidson, Jr.

HENRY E. DAVIDSON, JR.
Colonel, Armor
President, US Army Arctic Test Board

ANNEXES:

- A - Findings
- B - Details of Test
 - Section I - US Army Arctic Test Board
 - Section II - US Army Quartermaster Field Evaluation Agency
- C - Photographs (USAATB)
- D - Coordination, Plan of Test

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ANNEX A

FINDINGS

REMARKS

SUGGESTED CORRECTIVE ACTION

DEFICIENCY/SHORTCOMING

SECTION I

This section contains deficiencies requiring elimination in order to make the item acceptable for use on a minimum basis.

None.

SECTION II

This section lists those deficiencies and shortcomings in the item which were discovered during test and satisfactorily corrected prior to completion of the test. They no longer represent a defect in the item tested. The correction must be applied to the production model of this item.

None.

SECTION III

This section contains shortcomings which should be corrected, if it can be done without unduly complicating the item or inducing another undesirable characteristic, either concurrent with elimination of the deficiencies in Section I, or in production engineering, or by product improvement.

- | | | |
|---|---|---|
| 1. The 25-man modules average weight exceeded the Military Characteristics limit by 1.38 pounds. | None. This is not considered excessive since it amounts to less than one ounce per meal. Attention should be directed to retaining or reducing this weight. | Test Nr 1, Report of Equipment Failure Nr 11. |
| 2. In order to open the outer package of the test meal it generally required a knife or special tool. | Provide a tab on one end of the adhesive tape to facilitate opening. | Test Nr 2, Report of Equipment Failure Nr 13. |

<u>DEFICIENCY/SHORTCOMING</u>	<u>SUGGESTED CORRECTIVE ACTION</u>	<u>REMARKS</u>
3. Improper labeling of several food packages.	Provide better quality control.	Test Nr 2, Report of Equipment Failure Nr 4.
4. Fifty cheese and military spread tubes ruptured while kneading to thaw.	Provide a durable tube.	Test Nr 2, Report of Equipment Failure Nr 5.
5. Laminated foil liner split at the seams in several instances.	Provide a durable seam closure.	Test Nr 2, Report of Equipment Failure Nr 6.
6. Packaging inconsistencies such as no cups, salad dressing, cabbage slaw, improper candy, etc.	Provide better quality control.	Test Nr 2, Report of Equipment Failure Nr 7.
7. In most instances, pudding mix was loose in package and the dried milk packaged separately. In some cases the pudding mix and dried milk were packaged in independent bags within the package. The bags were not marked as to content.	Provide consistent packaging and identification of package.	Test Nr 2, Report of Equipment Failure Nr 8. A.2
8. Information sheets for the 25-man module were found in 6-man modules.	Provide correct information sheet in 6-man module and better quality control.	Test Nr 2, Report of Equipment Failure Nr 3.
9. No method or device is provided to strain debris from water obtained from melting snow.	Provide a cheesecloth type material to strain debris from melted snow.	Test Nr 2, Report of Equipment Failure Nr 12.

DEFICIENCY/SHORTCOMING

SUGGESTED CORRECTIVE ACTION

REMARKS

10. There are not enough beverages for 6 men. When prepared by instructions only $4\frac{1}{2}$ paper cups of juice are available for 6 men.

Increase amount of beverages to one full paper cup per man.

Test Nr 2, Report of Equipment Failure Nr 1.

11. Can openers broke, would not open and were too loose to open canned goods.

Provide a durable can opener.

Test Nr 2, Report of Equipment Failure Nr 14.

12. Preparation instructions for each meal show a disparity between over-all hot water required as specified in Step 1 and total water required for preparation of all individual foods in the meals as specified in Step 6.

Review and change water requirements as specified in instructions for each meal with a view to (1) reducing the quantity to that need for preparation of each meal and (2) eliminating conflicting statements of water requirements in the preparation instruction.

Test Nr 2, Report of Equipment Failure Nr 15.

13. The palatability of prunes, beans with tomato sauce, cabbage slaw, green beans, sliced beef, and meat balls is questionable.

Improve rehydration characteristics of bean items, sliced beef and meatballs. Improve taste of prunes, cabbage slaw and green beans or substitute more acceptable foods. Revise menus so as to eliminate serving beans with tomato sauce and the onions in the beef and onion gravy at breakfast.

See Section II, Annex B, par 4c.

SECTION IV

SUGGESTED IMPROVEMENT

This section lists suggested improvements which are not imperative but are desirable to increase quality or performance of the item.

SUGGESTED IMPROVEMENT

REMARKS

- | | |
|--|---|
| 14. Provide a longer knife with a beveled surface on both sides of the knife. | Test Nr 2, Report of Equipment Failure Nr 10. |
| 15. Change menu schedule to reduce feeding of similar meals on succeeding days. | Test Nr 2, Report of Equipment Failure Nr 15. |
| 16. Include in information sheet that two and one-third paper cups equal one canteen cup. | Test Nr 2, Report of Equipment Failure Nr 15. |
| 17. One additional accordinian fold on reconstitution boxes of the 6-man module should be provided. | Test Nr 2, Report of Equipment Failure Nr 15. |
| 18. Accessory packets in addition to present contents contain the candy bar and the knife and spoon. | Test Nr 2, Report of Equipment Failure Nr 15. |
| 19. Paper towelettes be placed in each module, both 6 and 25-man modules. | Test Nr 2, Report of Equipment Failure Nr 15. |
| 20. Additional coffee should be provided. | Test Nr 2, Report of Equipment Failure Nr 15. |
| 21. A small packet of pepper should be provided and included in the accessory packet. | Test Nr 2, Report of Equipment Failure Nr 15. |

ANNEX B

SECTION I

REPORT OF PROJECT NR ATB 3-202
US ARMY ARCTIC TEST BOARD

Test Nr 1 - Preoperational Inspection and Physical Characteristics:

1. PURPOSE:

a. To determine whether the test and control items were in proper condition for test.

b. To determine the physical characteristics of the Quick-Serve Meal.

2. METHOD:

a. Test rations were inspected after opening of the container and prior to meal preparation to determine that contents were in proper condition for test.

b. Test rations were weighed, measured, photographed and examined for other pertinent characteristics.

3. RESULTS:

a. Inspection of contents at the time of opening of the containers for meal preparation revealed that the Quick-Serve Meals were generally in proper condition for test. There were some inconsistencies in packaging as reported in Test Nr 2.

b. The Quick-Serve Meal was as described in paragraph 3, Description of Materiel.

c. The average weight and cube of the Quick-Serve Meal and the control ration were as follows:

Menu	6-MAN		6-MAN		25-MAN	
	Per 4-Module Pack		Per Module			
	Average Wt (lb)	Average Cube (cu-ft)	Average Wt (lb)	Average Cube (cu-ft)	Average Wt (lb)	Average Cube (cu-ft)
Breakfast	37.86	2.50	8.53	0.50	34.50	1.69
Dinner	37.29	2.54	8.37	0.52	33.30	1.69
Supper	44.09	2.80	10.10	0.65	41.30	1.85
Over-all	40.34	2.61	9.00	0.56	*36.38	1.74

Average

*(par 1, Annex A)

5-IN-ONE RATION

	Average Wt (lb)	Cube (cu-ft)
Menu Nr 1	32.00	1.07
Menu Nr 2	33.00	1.07
Menu Nr 3	30.00	1.07
Menu Nr 4	30.60	1.07
Menu Nr 5	30.93	1.07
Average	31.31	1.07

d. Photographs of the Quick-Serve Meal and the control ration are included in Annex C.1, C.2, and C.3.

Test Nr 2 - Operational Performance Characteristics:

1. PURPOSE: To determine the operational performance characteristics and acceptability of the Quick-Serve Meal.

2. METHOD:

a. During Phase I (controlled), the Quick-Serve Meal was consumed by personnel of an infantry rifle platoon over two 7-day periods and the control ration over a 3-day period. The second 7-day period, the Quick-Serve Meals consumed were those that had been cold-soaked for a period of 90 days. During conduct of the test, the rifle platoon, wearing appropriate arctic winter uniforms, participated in the exercises listed below. Ambient temperatures during this period ranged from 42°F to -66°F.

- (1) Road marches, w/full field marching load.
- (2) Long range patrols with full field marching load and combat loads.
- (3) Cross-country marches on skis and snowshoes.
- (4) Platoon attack and defense problems.
- (5) Field bivouacs of from three to seven days duration.

b. During Phase III (Extended Storage), 6-man modules that had been cold-soaked during the period 1 October 1961 - 1 March 1962 were consumed by personnel of this Board.

c. During the first 7-day period of Phase I, all hot water required by the menu under preparation was heated at one time. During the second 7-day period in an effort to reduce the time for preparation

of the Quick-Serve Meal, personnel were instructed to heat initially only the hot water requirements listed under paragraph 6 on the Information Sheet (only that required for reconstitution) with the addition of one-quarter to one-half canteen cup of water to allow for evaporation. After water initially heated was utilized for reconstitution, the additional water required for coffee was heated while reconstitution was taking place.

d. During the first 7-day period of Phase I, all 21 menus of the Quick-Serve Meal were fed in consecutive order. During the second 7-day feeding period, the schedule was revised as follows in an effort to reduce feeding of similar menus on succeeding days:

<u>DAY</u>	<u>BREAKFAST</u>	<u>DINNER</u>	<u>SUPPER</u>
1	4	7	5
2	6	3	3
3	1	6	7
4	3	2	2
5	7	4	6
6	2	5	1
7	5	1	4

e. During the first 7-day period of Phase I, test personnel were broken down into 6-man groups and fed the 6-man module. The second 7-day period personnel were broken down into 5-man groups and were fed the 6-man module.

f. During Phase II (Exercise "GREAT BEAR"), two rifle companies, one artillery battery and a tank platoon consumed the 6-man modules and to a limited extent the 25-man modules. Initially one rifle company consumed the Quick-Serve Meal for three days; the other rifle company consumed "C" rations for three days. At the end of this period, the rifle companies exchanged feeding plans for an additional three days. The artillery battery and tank platoon consumed the Quick-Serve Meal for five days, after which they reverted to normal feeding. Ambient temperatures during the period that the Quick-Serve Meals were consumed ranged from 20°F to -19°F.

g. During Phase I the carbon heater, combustion modular heater and the yukon stove were utilized to heat required water. During Phase II and III the yukon stove only was utilized.

h. By observation, participation, interrogation and analysis of test data, the following was determined:

- (1) Ease of opening packages and components.
- (2) Ease and speed of water heating.

- (3) Ease of preparation.
- (4) Palatability (FEA).
- (5) Ease of disposal of unconsumed elements.
- (6) Troop acceptability (FEA).
- (7) Adequacy of instructions for preparation of the meal.
- (8) Average time required to prepare and consume the meal.
- (9) Quantity of food (FEA).
- (10) Optimum module size.
- (11) Ease of obtaining water from snow or ice.
- (12) Water requirements for meal preparation (FEA).

3. RESULTS:

a. During an 18-mile road march, ambient temperature -6°F , and a long distance patrol, ambient temperature -15°F to -22°F , the following difficulties were encountered during preparation and consumption of the test meal outdoors:

- (1) The outer container could not be opened while wearing the Arctic Mitten Set without the use of a knife or other special tool (par 2, Annex A).
- (2) After hot water was added, the food could not be kept warm for the required reconstitution and serving time.
- (3) After food was served, the meal could not be consumed before becoming very cold and/or frozen.
- (4) It was impossible to consume the meal while wearing the Arctic Mitten Set.

b. During preparation of the test meal in sheltered and unheated areas, opening of the outer package of both 6-man and 25-man modules generally required a knife or special tool because of the strong adhesive quality of the tape (par 2, Annex A). No difficulty was encountered in opening the inner packets of either the 6-man or the 25-man modules.

c. During the first 7-day period of Phase I, when all water required by the menu was heated at one time, the time to bring the water to a boil ranged, using the Yukon Stove, from 15 to 50 minutes.

During the second 7-day period, when only water required for reconstitution was heated initially, the time using the Yukon Stove, ranged from 7 to 45 minutes (par 12, Annex A). The wide range of time encountered while using the Yukon Stove stemmed from various quantities of water used, different heat output, initial water temperature, snow content, and the lid of the water container not being tightly sealed in some instances.

(1) Of 15 Carbon Heat Units used, only one item provided sufficient heat to boil the required amount of water. Ambient temperatures ranged from 0°F to -25°F.

(2) The Heater, Combustion, Modular, required from 6 to 43 minutes to boil the required amount of water. The higher range of time resulted primarily from heater malfunctions. Excluding malfunctions, the time ranged from 6 to 15 minutes. Ambient temperatures ranged from 21°F to -40°F.

d. At the end of each 7-day period of Phase I, test personnel responded as follows when asked, "How hard or easy was it to prepare and serve the meals?"

	<u>VERY EASY</u>	<u>MOD EASY</u>	<u>MOD HARD</u>	<u>VERY HARD</u>	<u>NO COMMENT</u>
1st 7 days (Quick-Serve)	62.5	33.7	2.2	1.1	0.5
2d 7 days (Quick-Serve)	69.2	30.8	---	---	---
3 days (5-in-1)	3.38	15.25	58.48	22.04	0.85

(1) Minor difficulties were encountered because of improper labeling of some food packets and with the knife being too short to efficiently cut the bread and cake. Left handed individuals could not cut the bread or bread products efficiently as the knife provided deflected because of the beveled surface on one side of the cutting edge (par 3 and 14, Annex A).

(2) The following failures occurred:

(a) Fifty cheese and military spread tubes ruptured while kneading to thaw or while squeezing the contents from the tube during serving (par 4, Annex A).

(b) The laminated foil liners of 10 food containers were found to be split when the containers were opened (par 5, Annex A).

(c) Shortages of the following items were encountered (par 6, Annex A):

1. Salad dressing or cabbage slaw was not included in the food container in one instance, although called for in the menu.

2. Ten 6-man modules contained no paper cups.

3. In 10 instances, cereal bars were found substituted for candy, although substitutions were not indicated.

4. Two boxes of peaches were included instead of one box of peas and one box of peaches in one instance.

(d) In most instances, the pudding mix was loose in the package and the dried milk packaged separately. In several instances; however, both the pudding mix and the dried milk were packaged in independent bags within the package. The bags were not marked as to content (par 7, Annex A).

e. Palatability (See Annex B, Section II).

f. Disposal of unconsumed elements was accomplished by burning and melting all items except the tin cans. Residue from burning was buried in the snow. Where fires could not be utilized, all remaining trash from the meal was buried in the snow.

g. Troop Acceptability:

(1) (See Annex B, Section II).

(2) The revised feeding schedule was well received during the second 7-day period of Phase I. All test personnel indicated the revised schedule reduced the monotony of having similar food on consecutive days (par 15, Annex A).

(3) The majority of the test personnel commented on the strong and lasting taste of the onions in the beef and onion gravy of breakfast number 3.

(4) In most cases, beans, meat balls and the larger pieces of beef were generally hard and tough after reconstitution (par 13, Annex A).

(5) Beverages as packaged and when prepared per instructions contained only four and one-half paper cups of cocoa, milk or juices. This amount was not adequate for six men (par 10, Annex A).

(6) Test personnel repeatedly suggested the following improvements during conduct of test:

(a) Increase the amount of coffee products in all menus (par 20, Annex A).

(b) Accessory packets in addition to present contents should contain the candy bar, pepper and the knife and spoon, to eliminate unnecessary inner packets (par 18, Annex A).

(c) Soap or paper towelettes be placed in each module (par 19, Annex A).

(d) A small packet of pepper be included for each individual (par 21, Annex A).

(e) One additional accordian fold on reconstitution boxes should be provided (6-man module only) (par 17, Annex A).

(7) Approximately 40 percent of the can openers broke, would not open, or were too loose to open cans properly (par 11, Annex A).

h. Information sheets for the 25-man module were found in 6-man modules. No difficulties occurred since required information was furnished on the food container itself (par 8, Annex A). In some cases food containers were mislabeled but the information sheet was correct. When a clean canteen cup was not available, troops used paper cups as a water measuring device. Two and one-third of the paper cups provided with the 6-man and 25-man modules were found to be equal to one canteen cup of water (par 16, Annex A).

i. During Phase I the average time in minutes required to prepare and consume meals was as follows (See Table 1, Section II, Annex B, for average total feeding time required including disposition of residue):

	1st 7 days	* 2d 7 days	Over-all Average F/both periods	3 Days 5-in-1	Over-all Average for all meals combined
Breakfast	68.0	68.1	68.1	76.33	--
Dinner	61.7	69.1	65.5	68.38	--
Supper	74.8	73.1	73.8	56.84	--
Supper	68.3 (25-man modules)				
Quick-Serve	--	--	--	--	69.0
Five-in-one	--	--	--	--	67.51

*Last four days tactical feeding

j. Quantity of Food (FEA) (See Annex B, Section II).

k. The optimum module sizes were determined by analysis of test questionnaires utilized in Test Nr 5. Summary of subjective responses by commanders are as follows:

- (1) 83.30% preferred 6-man modules.
- (2) 5.50% preferred from 3 to 5-man modules.
- (3) 2.80% preferred 11-man modules.

(4) 2.80% preferred 12-man modules.

(5) 5.60% made no preference.

(6) 0.00% preferred 25-man modules.

l. The melting of snow and ice posed no major problems when troops operated from a 10-man tent with the Yukon Stove as a heating device. Melting was accomplished by placing a small amount of water in the test ration water container first and then adding snow or ice. This procedure produced water at a faster rate than when snow or ice was placed in the container without water. Small twigs, pine needles and other debris had to be strained from the melted snow or ice (par 9, Annex A).

m. Water requirements for meal preparation (FEA) (See Annex B, Section II).

n. During Phase II (Exercise "GREAT BEAR"), difficulties encountered with water heating were similar to those found in Phase I. In most cases test troops utilized the Yukon Stove as a water heating device. After the first day of the exercise, snow was utilized exclusively as a source of water. A food container from the 6-man module was generally kept on the stove throughout the day for the purpose of melting snow. This procedure was found to shorten over-all food preparation time appreciably.

o. During Phase I the average weight loss per man was as follows:

	lb
1st seven days - 6 men per 6-man module	2.83
2d seven days - 5 men per 6-man module	1.24
Three days 5-in-1 rations	2.57

NOTE: Average number of men 45. Test was not controlled to the point that weight loss could be attributed solely to the type ration fed.

p. No difficulties were encountered in Phase III other than those reported in Phase I above.

Test Nr 3 - Aerial Delivery:

1. PURPOSE: To determine the suitability of the Quick-Serve Meal for aerial delivery by parachute and by free fall.

2. METHOD:

a. Test 6-man modules (21 menus) were free dropped from a fixed wing aircraft (U1-A) in cases and by individual module. Altitude was 150

feet for first three passes and then 50 to 70 feet for remaining drops; speed was 100 knots. Ambient temperature was -23°F, no wind, snow depth was two and one-half feet deep.

b. Test 6-man modules (2 menus) were free dropped from a rotary wing aircraft (H-34) in cases and by individual module. Altitude was 100 to 150 feet, air speed was 50 knots, ambient temperature -5°F, no wind, snow depth two to three feet deep.

c. Test meals (6 and 25-man module (21 menus)) were delivered by parachute from a rotary wing aircraft (H-37). Altitude was 600 feet, speed was 90 knots, ambient temperature -47°F, no wind, snow depth two to three feet.

d. Eleven cases of 25-man modules were free dropped singly from a rotary wing aircraft (H-21). Altitude was 100 feet and speed was 90 knots. Ambient temperature was -47°F, no wind, and snow depth ranged from two to three feet.

e. Ten cases of 5-in-1 rations (two of each menu) were free dropped singly from a rotary wing aircraft (H-21). Altitude was 100 feet and speed 90 knots. Ambient temperature was -20°F, no wind, and snow depth ranged from 9 to 12 inches.

3. RESULTS:

a. Free drop of Quick-Serve Meals - see Annex B, Section II.

b. Of the 64 six-man modules delivered by parachute, five water containers were slightly bent but usable. Of the 21 cases of 25-man modules, 13 water containers were dented but were usable. One cardboard box containing jelly was smashed, but contents were usable.

c. Two cases of the control ration were dented but contents were usable after free drop.

Test Nr 4 - Impact on Tactical and Logistical Operations:

1. PURPOSE: To determine the impact of the Quick-Serve Meal on tactical and logistical operations at battle group level.

2. METHOD:

a. Portions of one battle group and a supporting artillery battery participating in Exercise "GREAT BEAR" were utilized in this test (Test Nr 2, par 2f).

b. All Quick-Serve Meals were introduced to the USARAL General Support Agency, supporting participating troop units. Both 6-man and 25-man modules were placed in open storage by module type and menu number.

c. All Quick-Serve Meals were issued per normal Class I procedures based on ration requests from participating troop units.

d. On one occasion during Exercise "GREAT BEAR" six 25-man modules (Supper Nr 3) were prepared for the noon meal and served to approximately 150 men of the Battle Group Trains area. Water was heated by using standard kitchen fire units and the meal was prepared by assigned cooks under the supervision of USAATB and FEA personnel.

e. By observation, participation, interrogation and analysis of test data, the following was determined:

- (1) Water requirements.
- (2) Means and ease with which water was transported and distributed.
- (3) Means and ease with which rations were transported and distributed.
- (4) Average time required to prepare, serve, and consume meals and effect necessary police.
- (5) Any limitations imposed.
- (6) Various methods utilized.

3. RESULTS:

a. Prior to the start of the tactical play of the exercise, the rifle companies and tank platoon utilized 5-gallon water cans and the artillery battery water trailers to transport the water required. During the period the test rations were being consumed, water was not delivered to test units because of the difficult terrain and the tactical situation. The water required was obtained by melting snow and ice. No problems were encountered except those listed in Test Nr 2, par 3.

b. Test 6-man and 25-man modules, were requisitioned in bulk by the participating unit and were delivered by truck from the general support area to the Battle Group Trains area. Because the test meals were loaded at the general support area without regard to menu or menu number, additional time was required to sort the items prior to issuing. All test meals were issued to test units in bulk and were transported from the trains area to using units by truck, M59 APC, M240 Carriers and H-21 Helicopters without difficulty. After helicopter delivery, supply points were set up by forward companies from which rifle platoon carrying parties utilized rucksacks and Ahkios to transport the test meals to the forward positions. The artillery battery and tank platoon experienced difficulty in transporting the test meals issued for five days because of the bulk of the items and the restricted space available on organic transport.

c. The over-all average time required to prepare, serve, and consume meals and effect necessary police during Phase II, ranged from 1 hour and 10 minutes to 1 hour and 50 minutes for each meal (breakfast, dinner or supper). In several instances, particularly in the rifle companies, 15 men were in a tent group and three 6-man modules were prepared. Tank crews generally prepared and consumed the test ration inside the five-man tent. Greater times required during this phase were believed attributable to the requirement for melting snow and the crowded preparation and feeding conditions, as well as some experience differential between troops used during Phase I and Phase II.

d. Principal limitation encountered was that of time. As both rifle companies were deployed in a holding position during the period the ration was fed, time was available to melt snow, prepare and consume the meal. The artillery battery and the tank platoon moved frequently during the first two days of the feeding period and could not prepare the meals because of time limitations. When time was available, no problems (except for melting of snow) were encountered.

e. The time required to boil 25 gallons of water (water temperature 200 degrees) using standard field ranges for the six 25-man modules used during Exercise "GREAT BEAR" was 2 hours. However, only a total of 12 gallons of hot water and 5 gallons of cold water was required. Preparation of the meal such as opening cartons, slicing bread, etc., was accomplished prior to the water coming to a boil. Pouring hot water into boxes and reconstitution required 30 minutes. The time required to feed the 150 troops was one hour.

f. No problems or difficulties were encountered during the preparation of the meal by mess personnel. The meal was well received by the participating troops.

Test Nr 5 - Command Acceptability:

1. PURPOSE: To determine the command acceptability of the Quick-Serve Meal.

2. METHOD:

a. This test was conducted in conjunction with Test Nr 2. Data were obtained by means of questionnaires completed by participating commanders and noncommissioned officers. These personnel were asked to express a professional opinion of the Quick-Serve Meal based on their field experience with the item (not only in Exercise "GREAT BEAR" but also from previous field experience to include combat situations). They were requested to compare the test ration with the 5-in-1 ration and not the "C" ration.

b. The degree of command acceptability was determined by analyzing the data obtained through questionnaires completed by officers and noncommissioned officers of the participating units.

3. RESULTS:

a. The following responses were obtained from the questionnaire:

TABLE I

(1) Did the use of the test ration system have any adverse effect on your ability to accomplish your mission?

- (a) Yes 2.95%
- (b) No 97.05%

TABLE II

(2) What over-all effect did the test ration system have on your unit?

(a) Command Flexibility:

- 1. No appreciable change in command flexibility. 79.20%
- 2. Increased command flexibility. 12.50%
- 3. Decreased command flexibility. 8.33%

(b) Time:

- 1. Allowed more time to prepare for and conduct tactical maneuvers. 15.28%
- 2. Required additional time to prepare for and conduct tactical maneuvers. 48.61%
- 3. No appreciable change in time required to prepare for and conduct tactical maneuvers. 36.11%

(c) Over-All Mobility:

- 1. Increased over-all mobility. 18.00%
- 2. Decreased over-all mobility. 27.80%
- 3. No appreciable change in over-all mobility. 54.20%

(d) Morale:

- 1. Was a boost to morale. 70.84%

2. Was detrimental to morale. 4.11%

3. No appreciable change in morale. 25.00%

(e) Feeding:

1. Easier to feed my troops. 38.88%

2. More difficult to feed my troops. 40.27%

3. No appreciable difference. 20.85%

(f) Troop Acceptability:

1. Did your troops generally like and accept this system of feeding? 69.45%

2. Did your troops generally dislike and reject this system of feeding? 13.89%

3. Were your troops more or less neutral to this system of feeding? 16.66%

TABLE III

(3) Rate the following feeding systems in order of your preference?

- groups.
- | | |
|--|--------|
| (a) Quick-Serve Meal prepared by small groups. | 55.60% |
| (b) Quick-Serve Meal prepared in a kitchen. | 8.30% |
| (c) 5-in-1 ration prepared by small groups. | 9.70% |
| (d) 5-in-1 ration prepared in kitchen. | 5.60% |
| (e) "B" ration prepared in kitchen. | 20.80% |

b. Principle advantage voiced by commanders was quality, variety, and taste of the food. Simplicity of preparation, lack of requirement for additional food containers and increase in morale were also stated as advantages.

c. Principle disadvantage voiced by commanders was bulk of package for transport and over-all time required to prepare meal to include melting of snow and boiling of water.

ANNEX B

SECTION II

Report of Project FEA 62010

QUARTERMASTER RESEARCH AND ENGINEERING
FIELD EVALUATION AGENCY
FORT LEE, VIRGINIA

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

TECHNICAL REPORT
FEA 62010

An Engineering Test Report of the Arctic Phase of the
Consolidated Engineer/Service Test of the 6-Man and
25-Man Modules of the Experimental Quick-Serve Meal

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AUTHORIZATION
FEA 62010

PROJECT
7-84-06-032

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April 1962

1. Introduction.

The Quartermaster Food and Container Institute has had under development since 1955 a system for field and combat feeding based on the use of freeze-dried and conventionally dehydrated ration components. This system, called Simplified Food Logistics (SFL) is comprised of three different rations. These are the Meal, Uncooked, 25-Man; the Meal, Ready-to-Eat, Individual; and the Quick-Serve Meal in 25- and 6-man modules. This latter item is designed to replace the present Ration, Small Detachment, 5 Persons, and, to some extent, the operational B ration. Of the 3 rations now under consideration only the Quick-Serve Meal has been sufficiently developed to the point where engineering/service testing is feasible.

The first full scale engineering/service test of the 21 meals comprising this ration was conducted by the U. S. Army Infantry Board and the QM R&E Field Evaluation Agency at Fort Benning, Georgia, during the period 3 - 7 April 1961. In addition, as part of this test under temperate conditions, an evaluation was made during Exercise LAVA PLAINS at Yakima Firing Center, Yakima, Washington, during the period 10 - 19 May 1961. Results of these tests have been published in a report prepared jointly by the QM R&E Field Evaluation Agency and the U. S. Army Infantry Board (2). The latter organization was responsible for conduct of the service test of the ration, and the Field Evaluation Agency for the engineering test.

This report describes the conduct and findings of the engineering phase of a consolidated engineering/service test of the experimental Quick-Serve Meal conducted under Arctic conditions. The test was conducted jointly by the QM R&E Field Evaluation Agency and the U. S. Army Arctic Test Board at Fort Greely, Alaska, during the period December 1961 through February 1962.

2. Objectives (1).

The objectives of the engineering portion of this test were:

a. To determine the operational performance characteristics of the Quick-Serve Meal in use in the Arctic in relation to the Department of Army approved Military Characteristics.

b. To determine the effect of low ambient temperatures on preparation, consumption, and disposal of waste of the Quick-Serve Meal during tactical operations in the Arctic.

c. To determine what effects the use of the Quick-Serve Meal in the Arctic will have on water supply and distribution.

d. To evaluate the ease of handling and opening of shipping containers under Arctic conditions.

e. To determine the advantages and disadvantages of preparing and consuming the Quick-Serve Meal outdoors under Arctic conditions.

3. Test Procedures.

a. General Approach.

(1) This engineering/service test consisted of two main operational phases. Phase I, the controlled engineering phase, was conducted in the Bolio Lake area of Fort Greely, Alaska, during December 1961 and January 1962. Phase II, which was primarily the service test portion of the project, was conducted in a maneuver area prescribed for Exercise GREAT BEAR, during the period 12 through 17 February 1962.

(2) Both the QM R&E Field Evaluation Agency and Arctic Test Board collected data during each phase of the test. Primary emphasis by the QM R&E Field Evaluation Agency during Phase I was placed on observations and data collection related to troop acceptability, food consumption, plate waste, and time and water required for preparation of the meals. During Phase II primary emphasis was given by the QM R&E Field Evaluation Agency to observations relating to logistical and other considerations reflecting on the ability of troops to use the Quick-Serve Meal, as well as the general suitability of the ration for use under Arctic conditions.

b. Detailed Procedure. Detailed test procedures related to troop use and an aerial delivery evaluation of the experimental meals, during the engineering and service portions of the test, are described in Annex B, Section I of the consolidated report of the test. Figures 1 through 4 show typical activities pertaining to troop operations and meal preparation during the engineering test phase.

4. Test Results.

a. Time Required for Meal Preparation.

(1) Meal preparation time recorded for the 6- and 25-man modules of the Quick-Serve Meal, and for the Ration, Small Detachment, 5 Persons,



Figure 1. Troop activity: Long-range patrol with full field gear.



Figure 2. Cross-country march on skis.

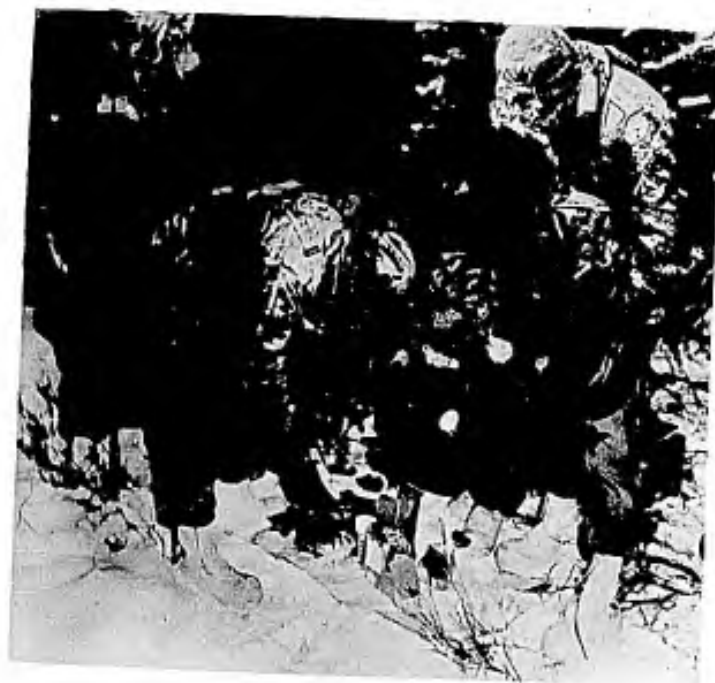
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FORT LEE, VIRGINIA
TEST FEA 62010

NEGATIVE 56xx, 59xx



Figure 3. Preparation of Quick-Serve 6-Man module in heated 10-man tent using Yukon stove.

Figure 4. Preparation of 6-man module on the trail using experimental Carbon Heater for heating water.



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NEGATIVE 37xx, Axx

included the total time required to prepare (including heating water during the 1st 7 days), serve, eat, and dispose of used trays and other residue from each meal. Table I shows the average total preparation time required during each of the 3 feeding periods comprising the engineering test phase. Averages reflect the preparation time for the Quick-Serve modules when prepared in different situations with specific types of heating devices. The time recorded as required to prepare the Ration, Small Detachment (5-in-1) did not include the time required to thaw the frozen cans nor to melt snow, or heat water on the Yukon stoves. For this reason care should be used in interpreting the time required to prepare and consume 5-in-1 and Quick-Serve Meals during the test period, and in comparing these elapsed times with times obtained previously.

(2) The three feeding situations described in Table I are intended to reflect possible ways in which ration preparation might be accomplished by small groups operating under Arctic conditions. A greater portion of the test meals was, of course, prepared in heated shelters in recognition of this situation being most typical of Arctic feeding procedures. The relatively few instances in which total preparation of meals was performed out-of-doors were designed to determine the effects of low ambient temperatures on preparation, consumption and disposal of waste of the Quick-Serve Meal.

(3) The average preparation time for the Quick-Serve Meal, when prepared indoors, during the first 7-day period, was approximately 7 minutes greater than that obtained for the second 7-day period in which this ration was used. This slightly higher time was probably due to lack of troop experience with the ration initially. This is borne out by the proximity of the average for the Quick-Serve Meal during the second 7-day period to the average for the Ration, Small Detachment, 5 Persons, with which the troops had had prior experience.

(4) It should be noted that preparation time for individual 6-man meals ranged from 40 to 120 minutes for the Quick-Serve Meal during the second 7-day period, and from 32 to 112 minutes for the Ration, Small Detachment, 5 Persons. The actual time required for preparation in any one instance could be affected by such things as the makeup of the meal, type and performance of heaters, initial temperature of the water, and time available to the men for preparation.

(5) With regard to indoor versus outdoor preparation of the Quick-Serve Meals, differences in average preparation times are dependent on type of heating device used and the actual feeding situation. Inability to use the same stove or obtain consistent performance from the same stove in both feeding situations makes a valid comparison with respect to preparation time impossible.

(6) While the preparation time of any ration is an important criterion of its suitability for use in the field, other factors are equally important. This is particularly true with respect to the use of the

TABLE I

AVERAGE TOTAL TIME REQUIRED TO PREPARE, SERVE, EAT AND
DISPOSE OF RESIDUE OF QUICK-SERVE AND 5-IN-1 MEALS

(All Breakfasts, Dinners and Suppers Combined)

Ration Type and Module Size	Feeding Situa- tions*	Where Water Heated	Where Meal Prepared	Type of Stove	No. of Modules	Time in Minutes	
						Avg.	Range
Quick-Serve, 6-Man (4-10 Dec. 1961)	a	Outdoors	Outdoors	Carbon Modular	4 10	83 66	60 - 110 48 - 87
	b	Outdoors	Indoors	Carbon Modular	10 43	84 66	51 - 107 43 - 96
	c	Indoors	Indoors	Yukon d	24	81	40 - 125
Quick-Serve 25-Man 4-10 Dec 61	b	Outdoors	Indoors	Modular	2	135	130 - 140
Ration, Small Detachment, 5-in-1 (14-16 Dec. 1961)	c	Indoors	Indoors	Yukon and M-1950, 1-burner	32	74	32 - 112
Quick-Serve, 6-Man 10-16 Jan. 1962	b	Outdoors	Indoors	Coleman 2-burner stove Modular	19 27	72 73	50 - 95 40 - 120
	c	Indoors	Indoors	Yukon d	40	74	47 - 110

*a - Water and food prepared and eaten in open while men were on the trail (snow melted to obtain water).

b - Water heated outdoors and food prepared and consumed in heated tent or building nearby.

c - Water and food prepared inside heated tent or building.

d - Water already warm or hot when meal preparation started. On some few occasions, cans of 5-in-1 were thawed prior to the start of preparation timing. No time was recorded for heating water when the Yukon Stove was used.

Quick-Serve Meal under ambient conditions in the Arctic. While the preparation times recorded in Table I do not appear to be unreasonable, other considerations mitigate against a general use of the ration outdoors.

(a) Specifically, it was observed during those meals prepared on-the-trail that the time required for boiling water was longer than in the temperate climate when using the Modular Heater. When using the Carbon Heater it was a rare occurrence to get water to boil. All attempts at boiling water were made with the lids of the aluminum water containers tightly sealed around the top of the container. In an effort to get rehydration water to the boiling point as many as 3 Carbon Heaters were used to heat the water for a single 6-man module.

(b) It was observed that once the water was heated and poured over the foods, it was extremely difficult to keep the food containers warm enough for proper rehydration. An improvised "double boiler" method was used by some 6-man groups. This consisted of placing the container of rehydrating foods into the metal water pan containing hot water and putting the entire assembly back on the stove. Other 6-man groups preparing meals on-the-trail built fires to keep both the food and themselves warm. Both of these methods can be regarded as field expedients which would permit limited preparation of Quick-Serve Meals in the open during Arctic weather.

(c) The ration was impossible to prepare and consume while wearing Arctic mittens. Because of this the men would remove their handwear and work barehanded. This practice is, of course, dangerous in the Arctic, as it can result in frostbite. While a soldier might stand near a fire and stay warm enough to prepare a meal without handwear, it should be noted that the practice of building open fires might be prohibited in many tactical situations.

b. Test Participant Opinion Regarding Preparation of Quick-Serve Meals.

(1) Individuals responsible for preparation of each meal were asked in an interview to express their opinions regarding the time required for preparation of the Quick-Serve Meal in relation to their experience with canned rations, and the ease or difficulty of preparing the Quick-Serve Meal. Responses to these questions are summarized in Table II.

TABLE II

TROOP OPINION REGARDING PREPARATION OF QUICK-SERVE MEALS.

Question and Response	1st 7 Days		2nd 7 Days	
	No.	Percent	No.	Percent
1. What do you think of the time required to prepare this meal?				
Far longer than canned rations	5	2.7	1	0.9
A bit longer than canned rations	30	16.3	2	1.9
About the same as canned rations	59	32.1	7	6.5
A bit faster than canned rations	55	29.9	62	58.0
Much faster than canned rations	32	17.4	35	32.7
No response	3	1.6	0	-
2. How difficult or easy was it to prepare and serve?				
Very easy	115	62.5	74	69.2
Moderately easy	62	33.7	33	30.8
Moderately hard	4	2.2	0	-
Very hard	2	1.1	0	-
No Response	1	0.5	0	-

(2) The combined percentage of individuals saying that preparation time was longer than for canned rations was 19 for the first 7-day feeding of the Quick-Serve Meal, and only 2.8 for the second 7-day period in which this ration was used. The more favorable response toward the Quick-Serve Meals during the second feeding period was no doubt due in part to experience with the ration during the first period which carried over to the second. In addition, the opinions of participants were probably influenced by the fact that all meal preparation during the second period was accomplished inside of heated shelters, while during part of the first period some Quick-Serve Meals were prepared and eaten outdoors. With regard to ease or difficulty of preparation it is apparent that a great majority of the participants considered the Quick-Serve Meal easy to prepare.

c. Palatability of Meals and Components.

(1) As a measure of the palatability of the Quick-Serve Meal and Ration, Small Detachment, 5 Persons, individuals in the various feeding groups rated all of the meals and specific meal components when consumed during each of the test feeding periods. Table III shows overall average ratings, by meal, for the Quick-Serve Meal and Small Detachment Ration.

TABLE III

AVERAGE OVERALL RATINGS^a FOR QUICK-SERVE MEAL AND
SMALL DETACHMENT RATION, BY MEAL - ENGINEERING TEST PHASE

<u>Quick-Serve Meal - First 7-Day Feeding (4-10 December 1961)</u>			
<u>Menu No.</u>	<u>Breakfast</u>	<u>Dinner</u>	<u>Supper</u>
1	7.27	7.68	7.69
2	6.93	7.87	7.28
3	7.30	7.49	8.39
4	6.13	7.65	7.83
5	6.83	7.54	7.42
6	8.33	5.75	7.75
7	8.00	7.92	7.71
Average	<u>7.25</u>	<u>7.43</u>	<u>7.69</u>

<u>Quick-Serve Meal - Second 7-Day Feeding (10-16 January 1962)</u>			
<u>Menu No.</u>	<u>Breakfast</u>	<u>Dinner</u>	<u>Supper</u>
1	6.79	7.24	6.68
2	7.45	7.30	6.80
3	6.70	7.13	8.40
4	7.47	6.75	6.50
5	4.90	7.45	7.55
6	7.45	5.55	7.85
7	7.60	7.20	6.95
Average	<u>6.95</u>	<u>6.95</u>	<u>7.25</u>

<u>Ration, Small Detachment, 5 Persons (14-16 December 1961)</u>			
<u>Menu No.</u>	<u>Breakfast</u>	<u>Dinner</u>	<u>Supper</u>
1	6.45	7.67	7.50
2	6.85	7.33	7.25
3	7.24	7.10	6.76
Average	<u>6.84</u>	<u>7.37</u>	<u>7.17</u>

^aNine-point hedonic scale used, where 9=Like Extremely, 8=Like Very Much,
....., 1=Dislike Extremely.

(2) The Table III data show that the 3 overall average ratings for breakfast, dinner, and supper meals of the Quick-Serve Meal during the second 7-day feeding period were below comparable averages for the initial feeding period. The difference between means was significant at the 5 percent level for the dinner and supper meals, but not for the breakfasts. The levels of the ratings for the second period, however, show that the ration was still highly palatable. It is also of interest that the overall meal averages for the Quick-Serve Meal during the second 7-day feeding period are generally comparable to the 3-day averages for breakfast, dinner, and supper meals of the Ration, Small Detachment, 5 Persons.

(3) Tables IVa through IVc show the average ratings obtained for selected components of the Quick-Serve Meal. Mean ratings for components of breakfast, dinner, and supper meals are listed separately.

(4) Based on the Tables IVa - IVc data, only 2 foods in all of the breakfast, dinner, and supper meals received average ratings during both feeding periods which would indicate a low troop palatability. These were cabbage (supper #2) and green beans (supper #6).

(5) There were instances in which comments were obtained concerning the toughness of certain meat items after rehydration. Specifically, 3 such comments were recorded regarding the sliced beef in suppers #2 and #7. Six (6) comments were recorded that the meatballs in dinners #6 and #7 were tough or hard after rehydration. Two (2) additional comments were recorded that the onions in the Beef and Onion gravy of breakfast #3 were strong and caused a "lasting" taste.

d. Quantity of Food.

(1) As a further indication of the palatability of the Quick-Serve Meal Table V shows, for the two feeding periods combined, the overall percent of food loss for those items with a 10 percent or more serving line and plate waste combined. The overall rating for these foods is also shown.

(2) While the wastage for all foods listed in Table V was higher than for other items in the ration, only 4 show percentages which exceed 20. Two of these items - prunes and green beans - also show extremely low ratings. The high waste and relatively high ratings shown for the beans with tomato sauce and cabbage slaw indicate that those individuals who consumed these items found them reasonably acceptable, while most of the participants disliked them enough to either reject them completely or eat little of what was taken from the serving line. A frequent criticism of the bean items was that in spite of efforts to rehydrate them, these foods remained very hard, and thus unpalatable. Another criticism of the beans with tomato sauce was that this food was not particularly acceptable for breakfast.

TABLE IVa

AVERAGE RATINGS^a OF SELECTED QUICK-SERVE MEAL BREAKFAST ITEMS

Menu	Food Item	4-10 Dec. 1961		10-16 Jan. 1962	
		Number of Men Rating	Average Rating	Number of Men Rating	Average Rating
B-1	Beef Hash	68	6.59	47	6.28
B-1	Oatmeal	68	6.47	47	7.02
B-1	Bread	38	6.55	19	7.11
B-1	Orange Juice	38	7.95	28	8.11
B-2	Scrambled Eggs	54	6.50	40	6.75
B-2	Bacon	52	7.69	39	7.77
B-2	Cocoa	-	-	19	7.89
B-3	Beef in Onion Gravy	36	6.98	42	6.93
B-3	Rice	36	6.08	42	7.10
B-3	Pecan Roll	-	-	22	7.36
B-3	Grapefruit Juice	-	-	22	7.18
B-4	Cheese Spread	23	6.00	49	6.73
B-4	Cocoa	23	7.52	39	8.26
B-4	Oatmeal	-	-	23	6.30
B-4	Bacon	-	-	23	7.48
B-4	Prunes	-	-	18	4.83
B-5	Beans with Tomato Sauce	51	6.45	44	4.59
B-5	Apple Juice	52	8.12	44	7.91
B-5	Bacon	27	8.04	24	8.17
B-5	Chocolate Fudge Bar	26	7.58	-	-
B-5	Bread	-	-	24	6.75
B-6	Pecan Roll	55	8.24	44	7.39
B-6	Orange-Grapefruit Juice	55	8.04	44	7.55
B-6	Scrambled Eggs	31	6.77	24	6.88
B-6	Bacon	31	8.13	24	8.00
B-7	Orange Juice	69	8.32	44	8.25
B-7	Cereal Bar	70	6.53	44	6.32
B-7	Scrambled Eggs	48	6.94	23	5.74
B-7	Bacon	47	7.66	24	7.92

^aNine-point hedonic scale.

TABLE IVb

AVERAGE RATINGS^a OF SELECTED QUICK-SERVE MEAL DINNER ITEMS

Menu	Food Item	4-10 Dec. 1961		10-16 Jan. 1962	
		Number of Men Rating	Average Rating	Number of Men Rating	Average Rating
D-1	Chili Con Carne with Beans	28	7.89	41	7.39
D-1	Apple Sauce	28	7.57	41	7.54
D-1	Milk	-	-	23	7.96
D-2	Spaghetti w/Meatballs and Tomato Sauce	52	7.65	44	7.41
D-2	Chicken and Rice Soup	51	7.55	44	7.43
D-2	Butterscotch Pudding	-	-	24	7.21
D-2	Bread	-	-	15	6.73
D-3	Chicken with Rice	35	7.26	45	7.38
D-3	Pea Soup	35	7.29	45	6.73
D-3	Apricots	-	-	25	5.64
D-3	Bread	-	-	25	7.36
D-4	Chicken Stew w/Vegetables	17	7.53	44	6.09
D-4	Lima Bean Soup	17	7.65	44	6.25
D-4	Chocolate Pudding	-	-	24	7.67
D-4	Bread	-	-	24	6.63
D-5	Beef Stew w/Vegetables	60	7.38	44	7.52
D-5	Grape Juice	60	8.02	44	8.11
D-5	Apple Sauce	36	8.08	24	7.63
D-5	Bread	34	8.11	15	6.80
D-6	Meatballs & Beans w/Tomato Sauce	24	5.46	40	5.48
D-6	Beef Broth w/Noodles	24	6.58	40	6.70
D-6	Fruit Cocktail	-	-	20	7.80
D-6	Bread	-	-	24	7.67
D-7	Meatballs w/Brown Gravy	78	7.44	49	6.63
D-7	Green Peas	78	6.70	49	5.69
D-7	Mashed Potatoes	53	7.62	19	7.26
D-7	Peaches	54	7.93	19	7.16

^aNine-point hedonic scale.

TABLE IVc

AVERAGE RATINGS^a OF SELECTED QUICK-SERVE SUPPER ITEMS

Menu	Food Item	4-10 Dec. 1961		10-16 Jan. 1962	
		Number of Men Rating	Average Rating	Number of Men Rating	Average Rating
S-1	Chicken and Gravy	73	7.49	42	7.12
S-1	Mashed Potatoes	73	7.30	42	7.05
S-1	Peas	45	5.80	23	4.78
S-1	Fruit Cake	43	7.56	18	7.83
S-2	Sliced Beef and Brown Gravy	85	7.09	44	7.14
S-2	Cabbage	85	2.28	44	4.77
S-2	Macaroni	-	-	24	7.38
S-2	Date Pudding	38	6.30	24	7.25
S-3	Sliced Beef Loaf & Tomato Gravy	78	8.31	46	8.48
S-3	Macaroni and Cheese	78	7.97	46	8.41
S-3	Apple Sauce	46	8.26	-	-
S-3	Pound Cake	-	-	26	8.42
S-3	Cocoa	42	8.52	17	8.35
S-4	Beef Pot Roast	61	7.16	45	5.98
S-4	Cream Corn and Lima Beans	61	7.72	45	5.80
S-4	Orange Nut Roll	36	8.17	25	7.68
S-4	Mashed Potatoes	37	7.59	25	7.08
S-5	Sliced Beef Loaf with Gravy	60	8.03	44	7.86
S-5	Cabbage Slaw	61	5.69	44	5.43
S-5	Mashed Potatoes	37	7.54	24	7.67
S-5	Fig Pudding	37	7.92	20	6.85
S-6	Swiss Steak	75	7.68	45	8.02
S-6	Green Beans	72	4.56	45	3.89
S-6	Mashed Sweet Potatoes	51	7.53	25	6.92
S-6	Chocolate Nut Roll	51	8.22	25	8.04
S-7	Sliced Beef with Barbecue Sauce	70	7.71	45	6.80
S-7	Chopped Spinach	68	5.62	45	5.27
S-7	Rice	42	7.40	25	7.36
S-7	Cocoa	19	8.47	-	-
S-7	Raisin Cake	27	7.81	20	6.90

^aNine-point hedonic scale.

TABLE V
QUICK-SERVE FOODS WITH 10 PERCENT OR MORE
FEEDING LINE AND PLATE WASTE COMBINED

Menu	Item	Overall Percent Food Waste	Average ^a Rating
B-1	Oatmeal	11.3	6.70
B-1	Beef Hash	15.1	6.46
B-3	Rice	14.1	6.63
B-4	Prunes	21.7	4.83
B-5	Beans w/Tomato Sauce	28.6	5.59
D-3	Chicken and Rice	12.5	7.33
D-7; S-1	Green Peas	16.7	6.04
S-5	Cabbage Slaw	39.1	5.58
S-6	Green Beans	25.5	4.30
S-7	Spinach	13.0	5.48

^aNine-point hedonic scale.

(3) Considering both the ratings and percentages of waste obtained for specific foods, the palatability of the prunes, beans with tomato sauce, cabbage slaw, and green beans would appear to be questionable. This is partly borne out by similar data obtained during the temperate phase of the Quick-Serve Meal test, which showed two of these foods - beans with tomato sauce and cabbage slaw - to be among those with the highest percentages of serving line and plate waste.

e. Troop Acceptability.

(1) A summary questionnaire administered to participating troops at the end of the first 7-day feeding period asked them to rate the suitability of Quick-Serve Meals for use in the Arctic. Responses to this question were distributed as follows:

	<u>No. Men</u>	<u>Percent</u>
Very Suitable	5	12
Moderately Suitable	37	86
Moderately Unsuitable	1	2
Very Unsuitable	0	0

(2) In addition to the general suitability question participants were asked to list any advantages and disadvantages of using the Quick-Serve Meals in the Arctic. The most frequent comments made were as follows:

Advantages:

- * (a) Preparation is faster than 5-in-1 ration.
- (b) Dehydrated foods will not freeze in open storage - no thawing required prior to preparation.
- (c) Meals are lightweight, and easy to carry.
- (d) Large variety of foods - taste like A ration.
- (e) With small group feeding it is not necessary to carry prepared food to troop positions.
- (f) Meal waste easy to dispose of.
- (g) No KP required.
- (h) Fact that individual food containers are not metal makes handling easier in the Arctic.
- (i) One man can prepare hot meal for 6-man group.
- (j) Aluminum water heating container is a useful by-product.

Disadvantages.

- (a) Preparation difficult in other than heated shelter.
- (b) Water freezes causing delay in preparation due to necessity for thawing.
- (c) Difficult to keep water heated during rehydration process (outdoors).
- (d) Canned bread should be pre-sliced. This, the military spread, and the jelly are the only items in the ration which will freeze.
- (e) Necessary to melt snow for rehydration water.

*Based on subjective opinion of troops.

(f) Eating utensils should have longer handles so they can be used when wearing Arctic mittens.

(g) Ration causes gas on stomach.

f. Water Requirements for Meal Preparation.

(1) The average number of quarts of hot water used in the preparation of 6-man modules of the Quick-Serve meals are shown in Table VI. Data are based on measurements obtained during each meal. During the first 7-day period the quantity of water heated was based on the over-all hot water requirements as specified at the top of the meal preparation instruction sheet. During the second 7-day period, the hot water requirements as stated on the individual food packets was heated first, then additional hot beverage water was heated while the foods were rehydrating. These procedures account for the reduced water consumption and reduced preparation time reported for the second 7-day period.

TABLE VI

AVERAGE NUMBER QUARTS OF HOT WATER USED FOR
PREPARATION OF INDIVIDUAL 6-MAN MEALS, BY FEEDING PERIOD

	Meal	Avg. Water Requirement by Menu							Overall Average
		1	2	3	4	5	6	7	
First 7-Day Feeding Period	Breakfast	5.6	5.1	5.0	5.6	6.0	4.6	3.0	5.3
	Dinner	5.0	5.6	6.0	5.6	5.5	6.3	5.1	5.7
	Supper	5.4	9.0	6.0	5.7	7.3	5.5	5.5	6.5
	Avg. for meals combined	5.3	6.0	5.7	5.6	6.8	6.0	4.9	5.8
Second 7-Day Feeding Period	Breakfast	4.5	5.1	4.0	5.9	5.0	3.6	3.9	4.6
	Dinner	4.3	5.3	6.0	5.8	5.0	5.1	5.8	5.4
	Supper	6.1	4.8	6.0	5.2	6.1	7.4	4.0	5.9
	Avg. for meals combined	5.0	5.0	5.3	5.7	5.5	5.4	4.8	5.2

(2) The above averages show some variation in the amount of water used for preparation of identical menus during the two feeding periods. This is also true to some extent for daily requirements as reflected by the average for breakfast, dinner, and supper meals combined for each menu. Averages combined across meals and menus, however, show no appreciable difference in the overall amount of hot water used for meal preparation during the two 7-day periods, even though there was some tendency to use more water during the first period.

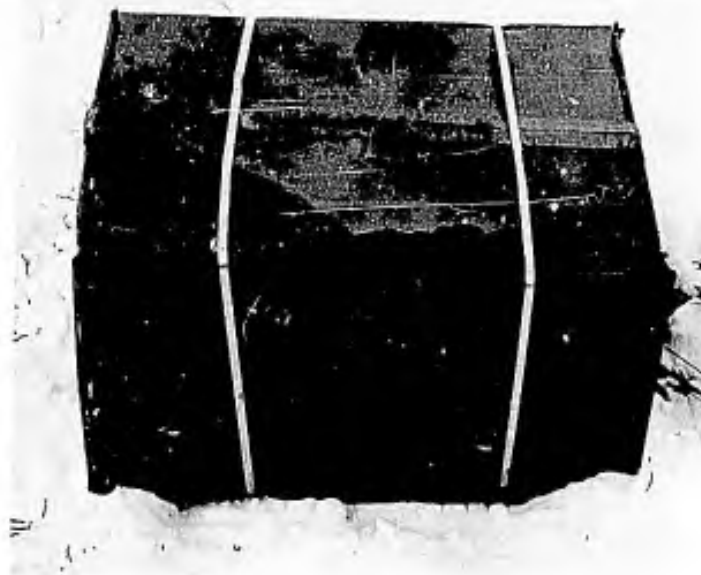


Figure 5. Aerial delivery damage to ration case containing four 6-man modules.



Figure 6. Components of 6-man module arranged after airdrop. Note damage to aluminum containers and serving tray, and lack of damage to food packets.

UNITED STATES ARMY
QM R&E
FIELD EVALUATION
AGENCY
FORT LEE, VIRGINIA
TEST FEA 62010
NEGATIVE 38xx, 23xx

h. Effects of Use of Quick-Serve Meal on Water Supply and Distribution.

(1) The procedure for supply and distribution of water in the Arctic is essentially the same as in a temperate climate; however, some environmental problems are imposed. To obtain water the Engineers must cut holes through the ice on lakes and streams. Additional problems are encountered in transportation due to the lack of road networks and deep snow on those available.

(2) Once water is pumped into tanks or cans for distribution it will, of course, freeze if not stored in heated water trailers or insulated 5-gallon cans. This is a critical factor in that individual water requirements are high in the Arctic due to the fact that men engaged in high-level physical activities tend to dehydrate rapidly in this climate.

(3) Water must be supplied to troop units of the lowest organizational echelon for washing, drinking, and cleaning of eating utensils when subsisting on present standard rations. When using the Quick-Serve Meal, water is required for washing, drinking, and meal preparation. Since the Quick-Serve Meal contains expendable utensils, water requirements for cleaning mess equipment are eliminated.

(4) When water resupply is not accomplished, snow or ice may be used as a source during the winter. During Exercise GREAT BEAR, when test units were tactically located, melted snow or ice was used for meal preparation, washing, and drinking. While this process was time consuming it should be recognized that such a procedure may be required at times whether the ration to be prepared is the Quick-Serve Meal or one of the present standard canned rations.

(5) If the test units had been subsisting on the A; operational B; Ration, Small Detachment; or C ration, it would have still been necessary to melt snow in order to obtain required water, although the amount required for meal preparation would vary with the type of ration used. In summary, if the Quick-Serve Meal is considered in proper perspective and fed under the same circumstances and tactical conditions as its standard counterpart, it should create no new problems, either in supply or distribution of water, as a result of its use in the Arctic.

i. Logistics.

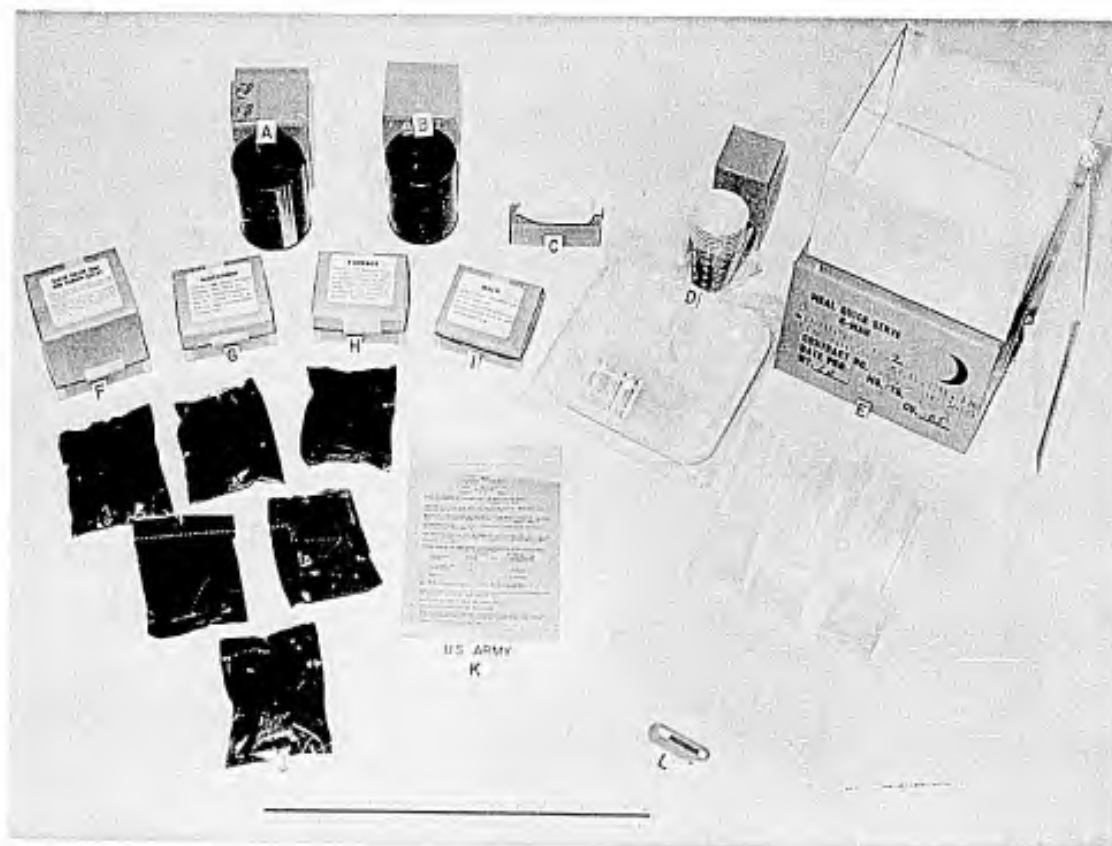
(1) Storage. All Quick-Serve Meals used in the engineering test phase were stored in the open at prevailing ambient temperatures for a period of 90 days prior to the test. There was little evidence of freezing or

other damage, with the exception of the canned bread, military spread, and jelly. The design of the Quick-Serve Meal thus makes it highly desirable for use in the Arctic since outdoor storage for a period up to 3 months apparently has no significant effects on either the outer or inner containers, or upon the ability of soldiers to prepare the ration immediately upon removal from storage.

(2) Handling and Distribution. The outer containers of both the 6- and 25-man modules were difficult to open. This was particularly true when wearing the Arctic mitten set. The difficulty was due primarily to the strong adhesion of the sealing tape on the outer container. In this connection the QM R&E Field Evaluation Agency has been notified by the QM Food and Container Institute that the tape placed on the outer containers was a temporary expedient provided for protection of contents during this test only. The use of such tape will be eliminated when a suitable method of sealing the aluminum water containers inside of each carton is developed. Thus the cited difficulty in opening containers during this test should not adversely affect the handling and distribution of the ration in the Arctic.

5. References.

1. Authorization - Letter QMASOF-MAG, Field Test Coordination Branch, Headquarters Quartermaster Research and Engineering Command, 21 August 1961, subject: "FEA 62010, Arctic Engineering Test of the 6-Man and 25-Man Modules of the Experimental Quick-Serve Meal."
2. Consolidated Report of the Temperate Phase of Consolidated Engineer/Service Test of Quick-Serve Meals: QM R&E FEA Report of Project FEA 61023, USAIB Report of Project No. 2943 - United States Army Infantry Board, Fort Benning, Georgia, 14 December 1961.



US ARMY ARCTIC TEST BOARD

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PROJECT NR ATB 3-202

17 OCT 61

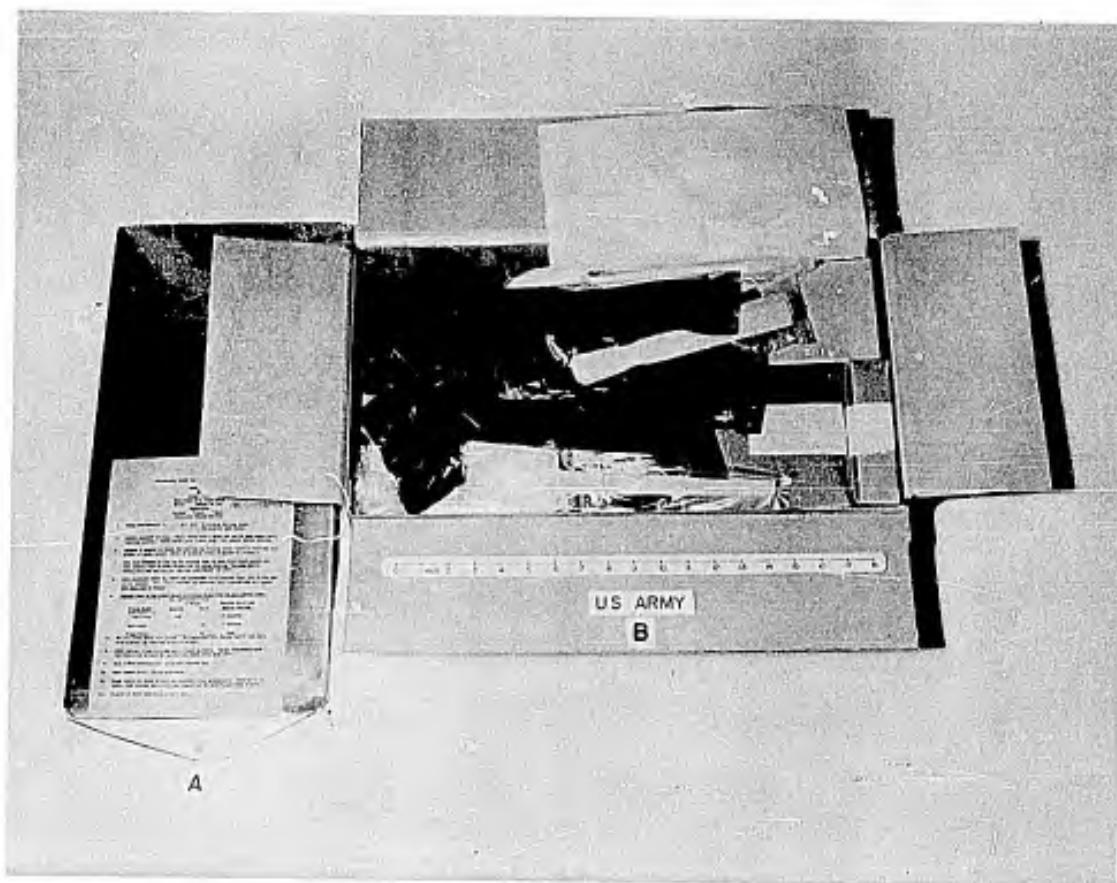
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ARCTIC PHASE OF

CONSOLIDATED ENGINEER/SERVICE TEST OF QUICK-SERVE MEALS

SIX-MAN MODULE

A, B - BREAD AND CAKE COMPONENTS	F, G,
C - MILITARY SPREAD	H, I - INDIVIDUAL FOOD CON-
D - PAPER TRAYS, CUPS, KNIVES,	TAINERS
AND SPOONS	J - ACCESSORY PACKETS
E - OUTER PACKAGING AND WATER	K - INFORMATION SHEET
CONTAINER	L - OPENER, PAPER TOWELS,
	AND MIXING SPOONS



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NEGATIVE NR 22-1

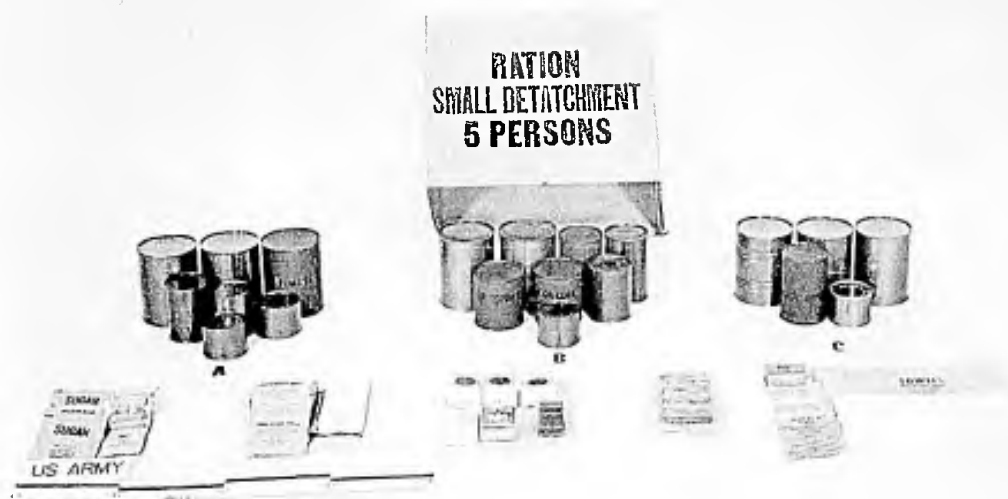
ARCTIC PHASE OF

CONSOLIDATED ENGINEER/SERVICE TEST OF QUICK-SERVE MEALS

TWENTY-FIVE-MAN MODULE (SAME COMPONENTS AS SIX-MAN MODULE)

A - INFORMATION SHEET AND WATER CONTAINER

B - OUTER CONTAINER AND CONTENTS



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PROJECT NR ATB 3-202

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NEGATIVE NR 472-1

ARCTIC PHASE OF

CONSOLIDATED ENGINEER/SEIVICE TEST OF QUICK-SERVE MEALS

FIVE-IN-ONE RATION

A - BREAKFAST MEAL

B - DINNER MEAL

C - SUPPER MEAL

ANNEX D - COORDINATION OF PLAN

UNITED KINGDOM AND CANADIAN COMMENTS

PLAN OF TEST - PROJECT NR 3-202

1. The British Liaison Officer, USCONARC, did not reply.
2. The Canadian Army had the following comment on the Plan of Test Project Nr ATB 3-202: "The Canadian Army agrees to the Plan of Test of Project Nr ATB 3-202."

UNCLASSIFIED

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